

REMARKS

I. Introduction

At the time of the Office Action dated August 1, 2005, claims 1-18 were pending. Applicant acknowledges, with appreciation, the Examiner's indication that claim 14 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In this Amendment, claims 2, 5, 6, 10 and 14 have been amended, and claims 1, 7 and 15 have been cancelled, without prejudice. Care has been exercised to avoid the introduction of new matter. Adequate descriptive support for the present Amendment should be apparent throughout the originally filed disclosure as, for example, the depicted embodiments and related discussion thereof in the written description of the specification. Applicant specifically notes that allowable claim 14 has been amended to be in independent form.

II. Objection to the Specification

The Examiner pointed out that "FIG. 3C" on page 7, line 25, should be --FIG. 2C--. In response, the specification has been amended in a manner suggested by the Examiner.

The Examiner further requested correction of errors in the specification, if any. Applicant has made cursory review of the specification, but did not find typos or grammar errors in the specification.

Withdrawal of the objection to the specification is respectfully solicited.

III. The Rejection of Claims 1-11, 13 and 15 under 35 U.S.C. §102(e)

In the statement of the rejection, the Examiner asserted that Paiam discloses an active optical MMI waveguide device identically corresponding to what is claimed. It is noted that rejection of claims 1, 7 and 15 has been rendered moot by cancellation of those claims.

It is well established precedent that the factual determination of lack of novelty under 35 U.S.C. §102 requires the identical disclosure in a single reference of each element of the claimed invention, such that the identically claimed invention is placed into the possession of one having ordinary skill in the art. *See EMI Group N. Am., Inc. v. Cypress Semiconductor Corp.*, 268 F.3d 1342, 60 USPQ2d 1423 (Fed. Cir. 2001); *Helifix Ltd. v. Blok-Lok, Ltd.*, 208 F. 3d 1339, 54 USPQ2d 1299 (Fed. Cir. 2000); *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994).

Applicant submits that Paiam does not disclose, among other things, two optical waveguides respectively having mutually different equivalent refractive indices, which realizes optical nonreciprocity, as recited in independent claims 2, 5, 6, 8 and 10. The claimed invention includes two optical waveguides having mutually different equivalent refractive indices, and a connection through which the two optical waveguides are connected along an optical axis. According to the claimed invention, optical nonreciprocity can be realized.

As shown in Fig. 1A of the present application, for example, first and second optical waveguides 10 and 20 are connected through connection 5 which allows light passing through second optical waveguide 20 to be coupled into first optical waveguide 10. Connection 5 also allows light passing through the first optical waveguide 10 to be propagated by first optical waveguide 10 while preventing the light from being coupled into second optical waveguide 20.

Turning to the prior art, Paiam discloses an optical switch including two waveguides each having the same refractive index at a room temperature, and a connection through which the two waveguides are connected. In operation, the temperature of the connection is varied so as to cause the two waveguides to have a refractive index different from each other, thereby allowing the optical paths to be switched. In short, Paiam's two waveguides have the same refractive index at the room temperature, and in order to switch the optical paths, the temperature of the connection has to be varied.

In contrast, the claimed invention does not require the temperature of connection to be varied in order to switch an optical path. The claimed waveguides respectively have mutually different equivalent refractive indices, and therefore, optical nonreciprocity can be obtained even at room temperature.

Accordingly, Paiam does not disclose an optical functional device including all the limitations recited in independent claims 2, 5, 6, 8 and 10 within the meaning of 35 U.S.C. §102. Dependent claims 3, 4 and 9 are also patentably distinguishable at least because they respectively include all the limitations recited in independent claims 2 and 8. Applicant, therefore, respectfully solicits withdrawal of the rejection of claims 1-11, 13 and 15, and favorable consideration of pending claims 2-6, 8-11 and 13.

IV. The Rejection of Claims 1 and 2 under 35 U.S.C. §102(b)

In the statement of the rejection, the Examiner asserted that Leonard discloses a multi-level architecture for optical time delays in integrated circuits identically corresponding to what is claimed. It is noted that rejection of claim 1 has been rendered moot by cancellation of the claim.

Applicant submits that Leonard does not disclose, among other things, two optical waveguides respectively having mutually different equivalent refractive indices, which allow for realization of optical nonreciprocity, as recited in claim 2.

Leonard discloses an optical coupler. The Examiner asserted that waveguides 401 and 402 correspond to the claimed first and second waveguide having mutually different equivalent refractive indices. However, there is no support for the Examiner's assertion because Leonard does not disclose that a refractive index difference is generated between waveguides 401 and 402 (or between waveguides 501 and 502). Moreover, in consideration of the function of an optical coupler, i.e., coupling light, it is apparent that light is coupled from one waveguide to the other waveguide by a connection through which two waveguides are connected. Therefore, because Leonard discloses an optical coupler, light is always coupled from one waveguide to the other by the connection and then is output. Leonard does not provide optical nonreciprocity, which is provided by the claimed invention having mutually different equivalent refractive indices.

Accordingly, Leonard does not disclose the claimed two waveguides having mutually different equivalent refractive indices which provide optical nonreciprocity. It is thus submitted that Leonard does not disclose an optical functional device including all the limitations recited in claim 2 within the meaning of 35 U.S.C. §102. Applicant, therefore, respectfully solicits withdrawal of the rejection of claim 2, and favorable consideration thereof.

V. The Rejection of Claims 12 and 16-18 under 35 U.S.C. §103(a)

In the statement of the rejection, the Examiner asserted that Paiam teaches an optical functional device and an optical module including all the limitations recited in claims 12 and 16-18.

Applicant submits that to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Paiam does not teach each and every limitation of the claims.

In response, Applicant submits that claim 12 is patentably distinguishable over Paiam at least because it includes all the limitations recited in independent claim 10. For the reasons set forth above, Paiam does not disclose all the limitations recited in claim 10 including two optical waveguides respectively having mutually different equivalent refractive indices.

By the same token, Paiam does not teach an optical module recited in claims 16-18 because the claims include two optical waveguides respectively having mutually different equivalent refractive indices. Since Paiam's two waveguides have the same refractive index at the room temperature, the temperature of the connection has to be varied to switch the optical path. In contrast, the claimed invention does not need to vary the temperature of the connection. Therefore, Paiam does not teach an optical module in claims 16-18 configured to have mutually different equivalent refractive indices, which realizes optical nonreciprocity.

Accordingly, Paiam does not disclose or suggest each and every limitation of claims 12 and 16-18 within the meaning of 35 U.S.C. §103. Applicant, therefore, solicits withdrawal of the 103 rejection of claims 12 and 16-18, and favorable consideration thereof.

VI. Conclusion

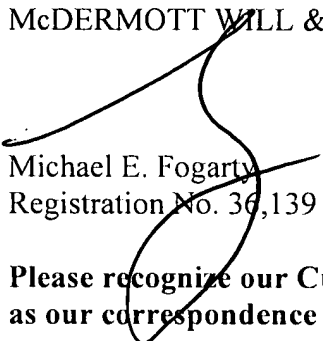
It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

Application No.: 10/717,558

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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